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AN INVESTIGATIVE MULTICENTRIC EVALUATION OF THE PSYCHOLOGICAL AND BEHAVIORAL SYMPTOMS THAT CORRESPOND TO DEMENTIA

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Abstract

Background: Dementia is typically predicted to result in behavioral and psychological symptoms (BPS). BPS has an impact on care expenditures, quality of life, and morbidity and burden. Less research has been done on the symptom features, clinical correlations, and symptom-specific clusters that help in diagnosis, particularly in the Indian population.

Materials and Methods: As part of a multicentric study conducted in India, the current study looked at the BPS clusters based on different cognitive and neuropsychiatric profiles in dementia patients. Using the Neuropsychiatric Inventory Questionnaire (NPI-Q), the Montreal Cognitive evaluation (MoCA) for cognitive functioning, and the Clinical Dementia Rating (CDR) scale for dementia severity, we conducted a cross-sectional evaluation. Furthermore, a standardized Clinical Interview for DSM-5 Research Version was used to assess each participant for previous psychiatric disorder(s).

Results: We outline the different BPS clusters that are specifically linked to dementia severity. Three symptom clusters (anxiety, irritability, abnormal motor) were predicted for mild dementia, two symptom clusters (disinhibition, agitation/aggression) for intermediate dementia, and three symptom clusters (delusion, euphoria/elation, disinhibition) for severe dementia based on linear regression analysis.

Conclusion: The research offers valuable understanding of the diverse symptom attributes and their correlations within BPS, potentially aiding clinicians in the evaluation of dementia patients.

Keywords: Dementia, Behavioral and psychological symptoms, clusters, NPI-Q, MoCA, CDR, psychiatric disorder(s).

Introduction

The illness known as dementia affects the elderly and is typified by a progressive loss of memory along with impairment in several areas of cognitive function.[1] An estimated 24.3 million people worldwide are thought to have dementia, and 5.3 million new cases are reported each year.[2] The Global Burden of Disease Study (GBD) revealed a concerning global trend of 43.8 million dementia

patients worldwide in 2020.[3] Developing nations like India are more obviously affected by this growing trend. Rapid epidemiological change that has resulted in an aging population, an increase in risk factors, and a rise in dementia prevalence has made India's situation unique.[4] As a result, dementia is no longer just a neuropsychiatric condition but rather an epidemic in India.[4]. Cognitive and behavioral symptoms (BPS) are frequent aftereffects of dementia.[5] Though cognition and behavior are two distinct aspects of dementia, they frequently interact, making daily living activities more difficult and negatively impacting quality of life.[6] The patients are impacted by the symptoms, which also cause a great deal of distress for the primary caregivers.[7] According to Petrovic et al. [8], 96% of dementia patients have at least one BPS. Anxiety and agitation are more common than apathy and depression. A few psychological conditions that lead to predominant impairment are emotional instability, abnormal motor behavior, psychosis, and changes in biological processes.[58].

Limited data from the Indian subcontinent indicates that around 100% of individuals with dementia experience at least one behavioral or psychological symptom, and 71% experience four or more symptoms. The most common symptoms are agitation and apathy, which are followed by emotional instability, changed bodily functioning, and irritability. Though acknowledged, psychosis affects a comparatively smaller percentage of individuals.[14] In addition, the pattern of BPS varies according to the subtypes of dementia; individuals with Alzheimer's disease, for instance, exhibit notably higher levels of delusions, hallucinations, and anxiety symptoms in comparison to those with vascular dementia.[11] In frontotemporal dementia, abnormal motor activity, disinhibited conduct, and aberrant eating behavior are more prevalent.[9]. There is a critical need to enhance the ability to recognize symptoms under different BPS clusters in developing nations like India. Making better clinical treatment decisions would be aided by the prompt detection of varied symptoms. Additionally, the prevalence of dementia varies by region in India due to the country's multiethnic, sociocultural, and environmental diversity, as well as BPS. Finding BPS clusters in dementia was the goal of the current investigation. We also aimed to determine the relationship between different behavioral and psychological indicators and the degree of dementia.

Materials and Methods

After receiving the required approval from the Indian Psychiatry Society for Research's Ethics Committee, this multicentric study was carried out. This cross-sectional multicentric study was carried out in six locations throughout the northern, southern, and eastern regions of India. Every participating site adhered to a standard research protocol, and the study was approved by the institutional ethics committee at each location. Data collection at each facility was overseen by psychiatrists with experience in diagnosing, treating, and treating dementia and related behavioral and psychiatric symptoms.Using the purposive sample approach, we included individuals with a primary diagnosis of dementia based on the ICD-10 DCR who were at least 70 years old. The study excluded patients having a history of psychosis, mood disorders, anxiety, OCD, substance abuse (except from smoke and caffeine), or personality disorders prior to the beginning of dementia. Written informed consent was obtained from every individual involved. With an anticipated prevalence of dementia between 3% and 10%, sample size estimation was based on an infinite sample computation with accuracy set at 8% and confidence interval (CI) at 99%.[1] An apparent precision of 0.2 was used to determine the sample size of 292.

To document sociodemographic and clinical features, a thorough semi-structured proforma was used for data collection.

A semi-structured interview called the Structured Clinical Interview for DSM-5 Research Version (SCID-5-RV) is used to diagnose mental illnesses in accordance with the DSM-5. Clinicians and other qualified mental health professionals use it. A thorough tool that provides present and lifetime disorders is the SCID-5-Research Version (RV).[12]

The Montreal Cognitive Assessment (MoCA) is a 30-point cognitive screening test consisting of one sheet that is performed in around ten minutes. The MoCA consist Yenepoya Medical University,ts of 12 subsets that target 7 cognitive functions: language (naming - 3, repetition - 2, fluency - 1), memory (delayed recall - 5), abstraction – 2, and orientation – 6. Visuospatial/executive function (trail-making test – 1, cube copy – 1, clock drawing – 3); attention and concentration (digit span test – 2, serial subtraction – 3, tapping – 1); and orientation – 6.[13] For MOCA, whose official schooling lasted less than 12 years, one score is added to their overall score.

Neuropsychiatric abnormalities in dementia are measured using the Neuropsychiatric Inventory Questionnaire (NPI-Q). Nonetheless, it was initially developed for Alzheimer's sufferers. It looks at 12 distinct symptoms and is thought to be equally appropriate to all forms of dementia. Because it is carried out in tandem with the caregiver, it represents their experience providing patient care. Delusions, auditory, gustatory, somatic, or visual hallucinations, agitation, depression, anxiety, elation, apathy, disinhibition, irritability, abnormal motor behavior (such as pacing, rummaging, or repetitive motions), sleep problems, and eating disorders or hunger disorders are among the symptoms that are measured.[14].

A global clinical scale with proven diagnostic and severity-ranking utility is the Clinical Dementia Rating (CDR). The scale assesses how well a person performs cognitively demanding activities in their native setting, taking into account their own cultural and ethnic background. It has strong face validity and is often more resilient to the negative effects of cultural prejudice.[15] There are four categories for dementia severity: mild (CDR 1), moderate (CDR 2), severe (CDR 3), and uncertain (CDR 0.5).

The Procedure

Following their fulfillment of the inclusion and exclusion criteria, patients were recruited. A thorough explanation of the study's information and objectives was given. Patients or their designated representatives provided written, informed consent. A thorough interview was performed by a psychiatrist in order to diagnose and evaluate a range of behavioral and psychological problems. Different measures were then used to assess the neuropsychiatric and cognitive symptoms. The period of data collection was October 2020–June 2023. Nonetheless, as a result of the ongoing COVID-19 pandemic and a decline in hospital patient visits.

Analyzing Statistics

Two ways to express categorical variables are as percentage and frequency. The expression for continuous variables is mean ± standard deviation. To evaluate the degree of relationship, linear regression analysis and the Pearson correlation coefficient were also used. The Statistical Package for the Social Sciences (SPSS) 26.0 for Windows was used to do the statistical analysis.

Results

Sample characteristics (sociodemographic and clinical)

For the study, a total of 292 participants were enlisted. The majority of the participants were chosen from teaching institutes under government control. The following centers provided samples: Chandigarh (PGIMER; n = 75), Murshidabad (Murshidabad Medical College and Hospital; n = 74), Puducherry (JIPMER; n = 31), Bhubaneswar (Sum Hospital; n = 30), Ranchi (Central Institute of Psychiatry, Ranchi and Rajendra Institute of Medical Sciences; n = 82). The majority of the sample (55.1%) was male; married (69.9%); of Hindu religion (75%); living in an urban area (43.8%); belonging to an extended or joint family (55.5%); and unemployed (32.5%). ***Table 1*** displays the average age of 69.97 ± 6.84 years and the average number of years of schooling at 7.99 ± 5.43 years.

The average age at which dementia first appeared was 65.90 ± 6.67 years, and the illness lasted 20.19 ± 11.74 months. Alzheimer's dementia was provisionally identified in 47.3% of the individuals, vascular dementia in 24.7%, and mixed dementia in 23.3%. While 22.94% of patients were either drug-naïve or drug-free, 20.9% of patients had previously used cognitive enhancers and antipsychotics. The majority of caregivers were their children (45.9%), with spouses coming in second (37.7%). ***Table 2*** shows that whereas 21.9% of caregivers were unaware of dementia/BPS, 34.2% had a high awareness of dementia.

VARIABLES (N=292)	**SUMMARY STATISTICS**
Age in years (Mean±SD)	69.97±6.84
Gender n (%)	
Males	161 (55.1%)
Females	131 (44.9%)
Religion n (%)	
Hindu	219 (75%)
Muslim	35 (12%)
Sikh	25 (8.6%)
Christian	11 (3.8%)
Others	02 (0.7%)
Residence n (%)	
Rural	128 (43.8%)
Urban	117 (40.1%)
Sub urban	47 (16.1%)
Marital status n (%)	
Single	06 (2.1%)
Married	204 (69.9%)
Widow(er)	66 (22.6%)
Divorced	04 (1.4%)
Others	12 (4.1%)
Years of education (Mean±SD) in years	7.99 ± 5.43
Monthly income (INR)	
<2390	51 (17.5%)
2391-7101	48 (16.4%)
7102-11836	53 (18.2%)
11837-17755	34 (11.6%)
17756-23673	24 (8.2%)
23674-47347	44 (15.1%)
47348 and above	38 (13.0%)
Family type	
Nuclear	115 (39.4%)
Extended/Joint	162 (55.5%)
Living alone	11 (3.8%)
Old age home	4 (1.4%)
Previous Profession	
Professional	20 (6.8)
Semi-professional	26 (8.9%)
Clerical/Shop Owner/Farmer	44 (15.1%)
Skilled worker	26 (8.9%)
Semi-skilled worker	30 (10.3%)
Unskilled worker	51 (17.5%)
Unemployed	95 (32.5%)

Table 1: Sociodemographic characteristics of patients with the diagnosis of dementia.

VARIABLES (N=292)	SUMMARY STATISTICS
Age of onset of illness (Mean±SD) in years	65.90±6.67
Duration of illness (Mean±SD) in months)	27.04 29.34 (3-156)
(Range)	
Duration of treatment (Mean±SD) in months	20.19±11.74
Diagnosis	
Dementia in Alzheimer's disease	138 (47.3%)
Vascular dementia	72 (24.7%)
Mixed dementia	68 (23.3%)
Other dementia	08 (2.73%)
Unspecified dementia	06 (2.1%)
Treatment	
No treatment	67 (22.94%)
Cognitive enhancers (CE)	53 (18.2%)
Antipsychotics (AP)	30 (10.3%)
CE+AP	61 (20.9%)
Others	04 (1.4%)
Treatment Unknown	77 (26.4%)
Primary caregiver	
Spouse	110 (37.7%)
Children	134 (45.9%)
Other informal caregivers	47 (16.1%)
None	01 (0.3%)
Awareness of dementia in the family	
Good	100 (34.2%)
Satisfactory	114 (39.0%)
Poor	14 (4.8)
No response	64 (21.9%)

Table 2 : Clinical characteristics of patients with the diagnosis of dementia.

The cognitive profile and behavioral and psychosocial signs of dementia

The degree of BPS was taken into consideration when creating the neuropsychiatric profile. Anxiety symptoms affected 28.1% of patients, nighttime behavior affected 29.8%, and appetite/eating problems affected 43.5% of patients. Apathy/indifference was present in 28.8% cases, dysphoria/depression in 29.8%, agitation/aggression in 34.9%, and moderate degrees of irritability/lability in 35.6% of cases. According to Table 3, the most common symptoms of severe BPS were irritability/lability (23.6%), nighttime behavior (23.6%), appetite/eating (20.9%), and abnormal motor behavior (20.5%). A mean MoCA score of 11.39 ± 6.08 was found.

Variables (n=292)	**Absent n (n%)**	**Mild n (n%)**	**Moderate n (n%)**	**Severe n (n%)**
Delusions	114 (49.3%)	45 (15.4%)	63 (21.6%)	40 (13.2%)
Hallucinations	162 (55.5%)	42 (14.4%)	47 (16.1%)	41 (14%)
Agitation/Aggression	86 (29.5%)	41 (14%)	102 (34.9%)	63 (21.6%)
Dysphoria/Depression	116 (39.7%)	54 (18.5%)	87 (29.8%)	35 (12%)
Anxiety	120 (41.4%)	82 (28.1%)	76 (26%)	14 (4.8%)
Euphoria/Elation	189 (64.7%)	26 (8.9%)	50 (17.1%)	27 (9.7%)
Apathy/Indifference	118 (40.4%)	29 (9.9%)	84 (28.8%)	61 (20.9%)
Disinhibition	156 (53.4%)	44 (15.1%)	62 (21.2%)	30 (10.3%)
Irritability/Lability	77 (26.4%)	42 (14.4%)	104 (35.6%)	69 (23.6%)
Aberrant Motor Behavior	123 (42.1%)	33 (11.3%)	76 (26%)	60 (20.5%)
Night-time Behaviour	87 (29.8%)	40 (29.8%)	96 (32.9%)	69 (23.6%)
Appetite/Eating	127 (43.5%)	127 (43.5%)	49 (16.8%)	61 (20.9%)

Table 3 : Behavioral and psychological symptom severity profile in dementia patients (N=292).

Bivariate association between the intensity of behavioral and psychological symptoms and the CDR-measured dementia severity

The link between BPS and the severity of dementia was examined using the Pearson correlation coefficient. A weak memory was positively connected with the intensity of delusions, anxiety, dysphoria/depression, and appetite/eating. However, there was a negative correlation found between the degree of irritability/lability and strong memory functions. The degree of delusions, dysphoria/depression, and euphoria/elation were all positively linked with poor orientation. The degree of hallucinations, euphoria/elation, and delusions was positively connected with poor decision-making and problem-solving skills.

Inadequate engagement in social and outdoor activities was found to be positively connected with the intensity of hallucinations, delusions, depression, and agitation/aggression. Personal care and household hobbies showed a strikingly comparable trend. In general, as dementia severity increases, there is a rise in the behavioral and psychological symptoms.

	Del	*Hal*	*Ag*	*Dys*	*Aux*	*Eup*	*Apa*	*Dis*	*Irr*	*.MB*	*NB*
Memory	0.251'' '	0.253 ''	0.079	0.153 ''	0.132'	0.128	-0.005	0.003	-0.126'	-0 044	0.006
Orientation	0.146'	0.10 5	0.000	0.127 '	-0.034	0.19 1''	0.038	- 0.031	-0 089	- 0.055	0.099
Problem solving	0.284''	0.164 ''	0.097	0.150 '	0.137'	0.374''	-0 026	0.016	-0 069	-0 081	0.040
Outer activities	0.216''	0.130 '	0.128 '	0.148 '	0.101	0.026	0.068	0.060	-0.111	0.066	0.037
Housework	0.247''	0.212 ''	0.026	0.165 ''	0.053	-0 032	0.032	-	0.196''	-0	-0018
Hobbies								0.054		048	
Personal care	0.134'	0.099	0.147 '	0.005	0.005	0.036	0.205''	0.175 ''	0.032	0.198 ''	0.136'

Significancelevel*P<0.05,*'P<0.01;Del.Delusions,Hal.Hallucinations,Ag.AgitationtAggression,Dys.DysphoriafDepression,Anxiety,Eup.EuphoriafElation,Apa.Apathy/Indifference,Dis.Disinhibition, lrr-lrritabilityf ability, MB-Aberrant Motor Behaviour, NB-Night-time Behaviour, App-Appetite/Eating

Table 4 : Bivariate association between the intensity of behavioral and psychological symptoms and the CDR-measured dementia severity.

Cognitive scores were used as a predictor in a multiple regression analysis of behavioral and psychological symptoms (dependent factors).

To determine the degree of correlation between the dependent factors—behavioral and psychological symptoms—and dementia severity, a linear regression analysis was performed. Consequently, a trend level association was discovered between moderate dementia and disinhibition; agitation/aggression and severe dementia and delusions; euphoria/elation (trend level) and disinhibition; and mild dementia and anxiety, irritability/lability, and aberrant motor behavior [***Table 5***].

Dependent Factors	**Unstandardized Beta**	**Ste!. Error**	*t*	*p*
Mild Dementia				
Anxiety	0.029	0.014	2.110	0.037*
Irritability/Lability	0.036	0.017	2.090	0.038*
Abe.rrru1t Motor	0.038	0.019	1.979	0.050
Moderate Dementia				
Disinhibition	0.026	0.013	1.966	0.052
Agitation/Aggression	0.036	0.020	1.863	0.065
Severe Dementia				

Delusions	0.109	0.046	2.353	0.025*
Euphoria/Elation	0.056	0.030	1.882	0.069
Disinhibition	0.097	0.047	2 065	0.047*

Predictor factor: Total MoCA score; Significance level *P<0.05

Table 5 : Predictor role of global cognitive scores on behavioral and psychological symptoms in dementia.

Discussion

Under the direction of the subcommittee, the current study was a multicentric investigation on BPS of dementia (IPS). 292 people from Chennai, Chandigarh, West Bengal, Puducherry, and Odisha were enrolled in the study. The study presents the clinical features, BPS clusters, sociodemographic information, and cognitive profile based on a range of clinical diagnoses on hospital-based samples. Studies conducted in the past in India have mentioned taking into account community or hospital-based samples.[51116] The mean age of the sample presenting with Alzheimer's dementia was 76.5 ± 9.1, and for vascular dementia it was 81.7 ± 8.6, according to a community-based study by Shaji et al. [17]. The mean age of the samples in a different study by Pinto and Seethalakshmi[16] was 65.1 ± 12.25 years. The average age in this study was 69.97 ± 6.84 years, which is in line with earlier research. The majority of the samples (55.1%) were male, (43.8%) were from a rural background, and (55.5%) belonged to a joint or extended family. First-degree relatives made up 45.9% of the informal caregivers, which is comparable to findings from other Indian research.[18] These numbers can be an indication of the sociodemographic makeup of the patients entering India's tertiary geriatric care facilities.

Clinical features of dementia patients

The average age of dementia onset, according to our data, was 65.90 ± 6.67 years. Alzheimer's dementia was the most common diagnosis (47.3%), followed by mixed dementia (23.3%) and vascular dementia (24.7%). According to earlier research from India, vascular dementia (39%) is the second most frequent type of dementia, after Alzheimer's disease (54%).[19] The global figures and the prevalence are likewise equivalent. According to data from developing nations, the prevalence of age-adjusted dementia is estimated to be between 1% and 3% in sub-Saharan Africa and India, with vascular dementia accounting for approximately 30% of cases and Alzheimer's disease accounting for roughly 60%.[20] According to the study, the average length of dementia was 20.19 ± 11.74 months. Patients who come to hospitals for treatment may take longer to get better. This could be because of subtle symptoms that take time to manifest, a delayed illness development, or a recent onset of BPS. In any case, it could be a sign that the patients' caregivers are not getting the necessary medical care.

The psychological and behavioral signs of dementia

It is commonly known that BPS can present with a wide range of symptoms that vary in severity and frequency. Prior attempts have been made to meaningfully comprehend and conceptualize the symptom clusters.[21] The psychotic syndrome, affective syndrome, abnormal motor activities, social interactions, speech, personality abnormalities, and physical symptoms were among the clusters that made up some of the conditions.[821] Regardless of the diagnosis, the majority of individuals in the current study had BPS. According to our study, the most prevalent symptoms are dysphoria/depression (59.3%), nocturnal behavior (69.2%), and agitation/aggression (69.5%).

At least 50% of patients who visited the facility had some sort of psychosis. Prior research by Shaji revealed a greater incidence of BPS in dementia patients, particularly in those with Alzheimer's disease. Delusions were more common, accounting for 65.5% of the BPS cases in that study, followed by activity disturbance (65.5%), violent behaviors (51.7%), and hallucinations (41.3%).

Furthermore, in dementia patients, delusions and hallucinations have been linked to a loss in cognitive and functional abilities.[22] The current study's findings, which are consistent with earlier research,

indicate that 51.7% of participants had delusions and 44.5% had hallucinations.[5] Higher frequency and severity of sleep disturbances have also been linked in previous research to disinhibition, sadness, or abnormal motor activities.[23] In 69.2% of the cases, we observed nighttime behavior, and in 57.9%, abnormal motor activity. Measuring nocturnal behaviors objectively revealed a stronger correlation between sleep disturbance and decreased functionality in dementia patients. According to correlational analysis, BPS is closely associated with the degree of dementia in the cognitive domain as well as areas such as judgment, orientation, problem-solving skills, outdoor and social activities, personal care, and, in general, the functional state of the person.[24] Moreover, many neuropsychiatric conditions independently influence functional status, regardless of age or particular memory and executive function tests.[22] Across daily living activities and functioning areas, we discovered a strong positive connection between BPS and the degree of dementia [Table 4]. Most notably, there is a positive correlation shown between memory impairment and anxiety, delusions, hallucinations, and depression/dysphoria. There appears to be a reciprocal association between this and dementia, with poorer consequences.[22] Delusions, euphoria/elation, and disinhibition were found to be substantially linked to worse cognitive function in cases of severe dementia. There has already been reporting on these "psychotic clusters."[29] Throughout the course of the disease, psychotic symptoms are possible; they typically surface in moderate-to-severe dementia (CDR 2 and 3).[30] Psychosis, on the other hand, is concerning because it would cause a major cognitive impairment in the illness.[21].

Conclusion and Limitations

This study examines the different behavioral and psychological symptom clusters associated with dementia while taking cognitive failure and dementia severity into account. While some BPS were unique, others were frequently mentioned as part of a similar cluster. However, because of inter-individual heterogeneity, the parameters could not be directly linked to the severity of the illness. Determining whether symptoms should be investigated in groups or individually may therefore be crucial.[21] Crucially, during the clinical work-up, professionals must carefully evaluate each symptom and keep in mind how they are related to one another while evaluating patients. The study had certain shortcomings. We did not employ the most recent criteria for dementia diagnosis. Due to the study's cross-sectional design, it was not possible to determine how long different BPS symptoms persisted over time or how they affected a person's cognitive state. In order to fully comprehend the BPS and evaluate their impact on everyday life, social functions, cognitive functions, and overall activities, future research may place a strong emphasis on the longitudinal study design. Future research may also focus on the effects of the illness and BPS that result from it on caregivers.

Conflicts of interest

There are no conflicts of interest.

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